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Local Competence Building and International Venture Capital in Low-Income Countries

Exploring foreign high-tech investments in Kenya's Silicon Savanna

Hain, Daniel; Jurowetzki, Roman

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Local competence building and international venture capital in low-income countries

Local
competence
building

Exploring foreign high-tech investments in Kenya's Silicon Savanna

447

Daniel Stefan Hain and Roman Jurowetzki
*IKE, Department of Business and Management,
Aalborg University, Aalborg, Denmark*

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Abstract

Purpose – The purpose of this paper is to shed light on the changing pattern and characteristics of international financial flows in the emerging entrepreneurial ecosystems of Sub-Saharan Africa (SSA), provide a novel taxonomy to classify and analyze them, and discuss how such investments contribute to competence building and sustainable development.

Design/methodology/approach – In an exploratory study, the authors analyze the characteristics of international venture capital investors and the start-ups receiving funding in Kenya and map their interaction. The authors proceed by developing a novel taxonomy, classifying investors according to their main rationales (for-profit-for-impact), and start-ups according to the locus of needs and markets addressed by the start-up (local-global) and the locus of the start-ups capacity and knowledge (local-global).

Findings – The authors observe a new type of mainly western investors who support innovative ideas in SSA by identifying and investing in domestically developed technical innovations with the potential to address global market needs. The authors find such innovations to be mainly developed at the intersect of global and local knowledge.

Originality/value – The authors shed light on the – up to now – under-researched emerging phenomenon of international high-tech investments in SSA, and develop a novel taxonomy of technology investments in low-income countries, guiding further research on the conditions, impact, practical, and policy implications of this new form of finance flows.

Keywords Entrepreneurship, Venture capital, Frugal innovation, Capability building, Economic development, Foreign investments, Local competences, Low-income countries

Paper type Research paper

1. Introduction

While in the last decade almost nonexistent, low-income countries (LICs) in Sub-Saharan Africa (SSA) nowadays account for a growing amount of international venture capital (VC) investments. In this paper, we aim to shed light on the changing pattern and characteristics of international finance flows in the emerging entrepreneurial ecosystems of SSA, and discuss how such investments contribute to competence building and sustainable development. Existing literature on international finance flows toward SSA mainly focused on the drivers and impact of foreign aid and foreign direct investments (FDI). However, VC in SSA is a rather new and, albeit its potential implications for economic development and capacity building, as of yet an unstudied phenomenon.



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The main part of such investments is channeled into information and communications technology (ICT)-related applications and ventures, which in the past have been inhibited by the chronically poor IT infrastructure associated with many SSA countries. Recent developments in data communication and processing, such as modularization and interface standardization, have made technology more accessible for business and users, while simultaneously making it less dependent on the surrounding infrastructure. These developments are described by a growing body of literature under the heading “Digital Entrepreneurship in Africa” (e.g. Bramann, 2017; Drouillard *et al.*, 2014), which also recognizes the current emergence of supportive entrepreneurial ecosystems, including the role of the government, non-governmental organizations (NGOs), universities, tech hubs (Kelly and Firestone, 2016; Park *et al.*, 2017a), and investors (Hain *et al.*, 2017). This paper focuses on the characteristics of the latter.

In a first attempt to shed light on the currently unfolding dynamics of international VC investments into emerging ecosystems in SSA, we carry out an exploratory analysis of domestic entrepreneurial activity and foreign investments at the case of Kenya. By doing so, we identify a set of qualitative characteristics that account for the main variation between finance flows toward SSA over time, which we further reduce into two dimensions, namely the needs and markets served by the product or service offered by the investment target (developed vs less-developed country needs); and the origin of knowledge embedded in this product or service (global/western vs local/indigenous knowledge). Accordingly, we classify the observed international investments in Kenya along these dimensions, where we observe a shift from investment targets that use indigenous knowledge to serve exclusively local needs, or merely apply western knowledge to produce likewise western consumer goods, toward more mixed forms. This developed taxonomy might provide a useful tool to analyze the dynamics of emerging entrepreneurial ecosystems based on revealed foreign investment activity.

As result of this analysis as well as studying the historical account of foreign finance flows toward SSA, we propose a novel taxonomy of investments in LICs, which is drawn from global value chain (GVC) on capacity building and upgrading (cf. Ernst, 2002), as well as catching-up (cf. Kim, 1997; Malerba and Nelson, 2011) and VC (Avnimelech *et al.*, 2006; Saxenian and Sabel, 2008) literature on economic development. In addition, we relate the present case to the discussion on frugal innovation (Radjou *et al.*, 2015; Rao, 2013; Tiwari and Herstatt, 2012), Bottom of the Pyramid (BoP) innovation (Bhatti, 2012; Zeschky *et al.*, 2014), and inclusive innovation (e.g. Chataway *et al.*, 2014; Foster and Heeks, 2013), which outline the importance and potentials of integrating local perspective and capacity when developing products and services for the BoP markets as well as for the rapidly growing middle class in LICs. We thereby contribute to the existing body of knowledge on the impact of finance and foreign +local interaction on economic development in several ways. First, we shed light on a novel yet under-researched phenomenon and discuss its implication for local competence building and catching up in SSA, which stand in stark contrast to the contemporary dominant view on economic development in the global south. Second, we provide a taxonomy of international finance flows in LICs, which explicitly takes the capabilities embedded in investment targets as well as their potential markets into account, thereby providing a measure of their current competitive advantage and development potentials. This leads to direct implications for investors considering to engage in activities in LICs, policymakers who aim at attracting such investors, donor-organizations as well as research on the co-evolution of technology, local capabilities, and capital allocation decisions on international financial markets.

The remainder of the paper is structured as follows. In the next section, we review the history and investigate the characteristics and rationales behind international finance flows toward SSA, where we identify a set of dimensions that account for the main variation between these flows over time. Thereafter, we carry out an exploratory analysis of international equity investments (mostly VC) in the case of Kenya, where we classify investors and start-ups, and map the interaction between them. Building on the established

theoretical foundation, and substantiated by our analysis, we develop a novel taxonomy of investments that captures the interplay between investment characteristics and local capacity development. The final section concludes, draws implications for policy and practice, and suggests promising avenues for future research.

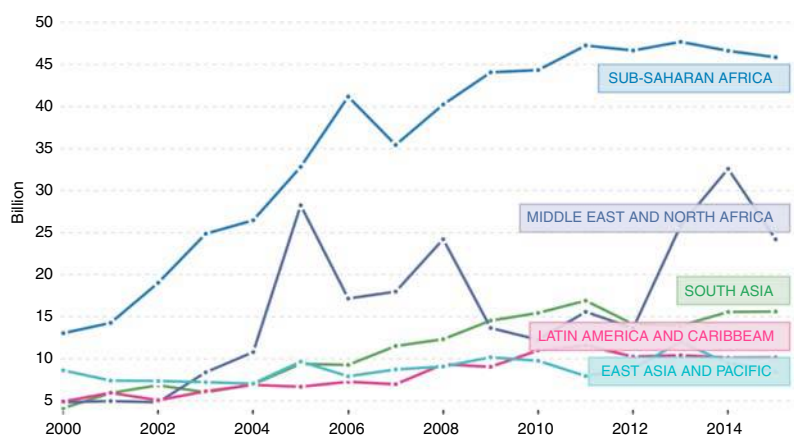
2. Background: recent development of investment characteristics in SSA

At the beginning of this century, investments in most parts of SSA were considered by most western countries as not attractive. The lack of basic infrastructure, low levels of education, high political instability, and low purchasing power in many African countries made it unlikely for private investors to find profitable investment opportunities (Eifert *et al.*, 2005; Ikejiaku and Mordi, 2010). Exceptions were mainly large multinational enterprises (MNEs) that found ways to extract profits by exploiting low wages for labor-intensive work, or to harvest the rich endowment of natural resources. Particularly, Chinese investments have received much attention[1]. This section presents a brief overview of the various finance flows into SSA since the beginning of the twenty-first century to provide a more detailed understanding of how the recently observed investment characteristics are set apart from previous finance inflows.

First wave – early twenty-first century: growing aid inflows

While not being able to attract substantial private investments and titled as “the hopeless continent” (*The Economist*, 2000), there was a perception in the western world that most parts of African were not able to lift themselves out of poverty and create sustainable economies with the resources at hand. Consequently, the African continent has been the main receiver of global financial aid in the last decades (see Figure 1).

Dedicated to address pressing issues such as extreme poverty and accompanying malnutrition, lack of availability of medical supplies, and inappropriate housing and sanitary conditions, actors like governments, NGOs, foundations, and private philanthropists channeled growing amounts of resources in projects that aim to either directly address the consequences (providing food, medical supply, shelter, etc.) or indirectly their assumed causes (providing basic education, etc.). Indeed, during this period many



Note: Data were accessed through the World Bank Open Data platform at <https://data.worldbank.org>

Figure 1.
Aid flows at current
USD, data: World
Bank

African countries received historically unprecedented inflows of resources with aid characteristics in an order of magnitude that made them a substantial part of national budgets[2]. At this time, there was a general belief that many African countries were dependent on this external resources to cope with its internal problems (cf. Moss *et al.*, 2006) by means of their resources and solutions.

Second wave – late 2000s: the rise of FDI and MNE activity

With the beginning of the current decade, Africa's emergence appears to be a new consensus. Even though still – on average – the poorest continent in the world, steady growth since the beginning of this century resulted in the emergence of an African middle class[3]. While *The Economist* (2013) now calls it “the hopeful continent,” the private sector has started to realize profitable investment opportunities, particularly in the rising ICT hotbeds Kenya and Nigeria. As a consequence, in 2013 private investments surpassed the amount of financial aid received (IMF, 2013)[4].

The first wave of such investments was market driven and primarily carried out by MNEs, with the intention to exploit accelerating economic growth again by replicating successful business models from advanced economies in the context of developing ones (UNCTAD, 2014). Increasing purchasing power over a critical point rapidly created large markets for relatively advanced products such as, for instance, smartphones.

Third wave – early 2010s: emerging investor awareness of local capacity

As the latest development up to now, it can be observed that companies, as well as investors, begin to realize the yet untapped innovation capacities arising from fundamentally different social, institutional, and economic context. The environment is characterized by pressing local needs paired with low purchasing power and underdeveloped infrastructure. However, recently access to increasingly affordable ICT and the internet triggered “out-of-the-box” thinking, which resulted in commercially promising and often scalable concepts. Similar developments, coined as catalytic, frugal, or BoP[5], could already be observed earlier in emerging economies such as India or Taiwan (Radjou *et al.*, 2015). The results often address needs with “good-enough” affordable products, focusing on basic but qualitative functionality, which are easy to use and robust (Zeschky *et al.*, 2014). Classical examples of such innovations are the “Tata Nano,” a car available for 2,000 USD, or the “Narayana Hrudayalaya Hospital” which offers specialized surgeries at costs affordable even for the poor. Besides offering profit opportunities for global investors, investments in such innovation also create huge potentials for economic development in their country of origin. It has been argued that instead of falling in the trap of dependence on social investments, which ultimately maintain the status quo by creating either non-capacity building or poor performing and economically unsustainable results (Bramann, 2017), such investments help create profitable and scalable innovations aimed at resolving the needs of large underserved segments (Christensen *et al.*, 2006). Also, production processes are usually geared toward being efficient with the resources and infrastructure at hand, contrasting with western resource-intensive and infrastructure reliant large-scale production.

Also similar to developments we saw earlier in many of today's emerging economies such as India or Taiwan, the emergence of an ICT sector can be observed (Drouillard *et al.*, 2014). Among others, the privatization of the telecommunication sector in Kenya (cf. Zavatta, 2008) has attracted international investments (Ernest and Young, 2014) in establishing mobile and internet infrastructures, but also spurred domestic entrepreneurial activity (Bramann, 2017). Figure 2 shows the constantly growing number of internet users, particularly in Kenya and Nigeria, which not only suggests increasing tech-competence in the population but also indicates a growing market

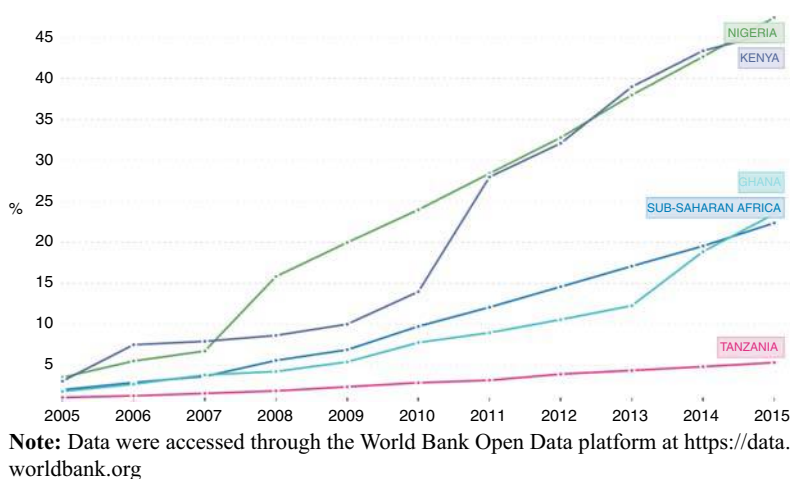


Figure 2.
Internet use in percent
of population, data:
World Bank

potential for domestically developed technology-intensive solutions. The wide diffusion of mobile phones and more recently smartphones has generated additional dynamism. In line with this trend is the opening of IBM's first African research laboratory in the outskirts of Nairobi in November 2013 and the associated investments of ten million USD. The activity of this laboratory is centered around smartphone-based applications and business models. Similar strategies can be seen in the activity of other major IT firms. In 2015, Microsoft launched Biz4Africa, an online platform for SMEs in collaboration with Kenyan accelerator hubs that work with cloud-based business solutions. Finally, also Google became present in SSA, funding start-up hubs in Nigeria, Kenya, and South Africa (UNCTAD, 2014). While Kenya, Nigeria, and South Africa are leading this development, similar can be observed all across Africa. The World Bank undertakes since 2014 a mapping of hubs that support digital entrepreneurship and has in its recent round identified 117 hubs across Africa (Kelly and Firestone, 2016). A mapping from July 2016 by the global telecoms industry body GSMA Ecosystem Accelerator suggests that there were over 300 hubs and similar spaces across 93 cities in 42 countries.

The increasing diffusion of mobile phones and internet coverage offers a manifold potential for creative, scalable business models only requiring minimal upfront investments in the spirit of Silicon Valley's "app economy" (Gathigi and Waititu, 2012). Coincident with this development, new types of investors started to enter the business landscape.

While in the past nonexistent, early in this decade growth-oriented tech-investors started to get involved in some economies in SSA such as Kenya and Nigeria. The most prominent form of such equity-based tech-investors is venture capitalists (VCs), willing to bear high firm-, market-, and technology-related risks, they, in return, require high-profit opportunities. Consequently, eligible businesses have to be highly scalable and with a potential to address large markets. The fact that such investments finally arrive in SSA is a positive signal, as it suggests that there exist young companies with innovative products, services, or business models which are potentially fit for international or even global markets. This picture fits well with the arising speculations about countries such as Kenya and Nigeria becoming the "new emerging" markets who may follow the development path of the BRICS countries.

In summary, when considering the development of finance inflows into SSA from the beginning of this century, we see considerable changes in their sources as well as their characteristics and underlying rationales.

In the late 1990s and early 2000s, resources channeled to LICs of SSA primarily had foreign aid characteristics and were dedicated to solve short-term local problems associated with poverty, such as malnutrition or lack of medical supply. The main concern of actors such as governments, NGOs, or private philanthropists in doing so is the social impact of their investment, which was not expected to provide any direct returns to the investor.

Early profit-oriented foreign investment activity was mostly carried out by foreign MNEs and focused on the extraction of natural resources such as oil, gas, and metals, or exploiting the high supply and low costs of unskilled labor as found by Barthel *et al.* (2011) looking at FDI in Ghana. The study finds that while FDI creates jobs, foreign currency inflows, and royalties, extensive technology spillovers are not occurring. The resulting products of such activities first served international markets; however, with increasing domestic purchasing power, MNEs gradually started to target domestic markets with their African production facilities.

With the diffusion of ICT and mobile communication, various forms of digital entrepreneurship have mushroomed across Africa (Park *et al.*, 2017a), gaining in some cases attention from international VCs. We see this as a strong indication of the innovation potential that lies in young African ventures that may help attending local needs and possibly even develop products and services, suited for the global market.

3. Theoretical considerations

We observe finance flows toward SSA not only steadily increasing in quantity, but also changing in quality. In the following, we draw from insights of various strands of literature in order to understand on the one hand the features of emerging innovative ventures and technologies in SSA and on the other the characteristics of and rationales behind different types of finance flows, thereby try to explain the observed shift of dominant flows, deriving potential implications for SSA. In this doing, we also focus on the interplay between the investment characteristics, innovative features of ventures and technologies, as well as the knowledge and capacity development dimension.

To shed light on the new emerging features of the innovative ventures in SSA, we briefly review the discussions on frugal, BoP, and inclusive innovation.

To capture the first phase of finance flows, which is characterized by investments with aid characteristics aiming primarily for social impact, and since 2000 closely linked to the Millennium Development Goals (MDGs), we will briefly review the literature on development aid and innovation.

To understand the implications of the second phase, mostly characterized by FDI and other forms of corporate activity of MNEs, we draw mostly from the literature on GVCs as well as global production networks (GPNs) and the line of thought on “catching-up.” We do this not to build on this literature but to contrast our observations with it, outlining similarities and differences with regard to local capacity building.

Finally, to capture the latest phase of technology-focused investments, we consult literature on the internationalization of VC.

Locally embedded innovation

Our cases illustrate the emergence of ventures that combine various types of knowledge and capabilities to address market and social needs that are imperative within but not confined to the local context. Many of them show a strong resemblance to features discussed in the literature on frugal innovation (Radjou *et al.*, 2015; Rao, 2013; Tiwari and Herstatt, 2012), BoP innovation (Bhatti, 2012; Zeschky *et al.*, 2014) – noting that these literature are different but share some commonalities. While cases that relate to these two strands of literature typically correlate local skill and knowledge with smart low-tech

solutions and frugal high-tech products are linked with companies from the developed and emerging markets, in our case, we face a novel connection of features. We observe, what seems to be an integration of knowledge and skill from different origins[6], high-tech features, frugality, as well as elements of BOP innovation reasoning. A recently emerging discussion on inclusive innovation (e.g. Chataway *et al.*, 2014; Foster and Heeks, 2013) also started discussing more advanced technologies. The best-known example is the diffusion of mobile phones in SSA (Foster and Heeks, 2013) and the subsequent proliferation of various types of innovations developed in these countries. There are two central questions that can be found in all of the above strands of literature: first, where do the innovation inputs come from? This includes capital, knowledge, and broader capacity – the term that we would like to use in the following. Second, whose problems are solved by the innovative venture or technology? All of the above bodies of literature emphasize the importance of drawing on local capacity for addressing local needs, thereby the locus of these two dimensions – global vs local – becomes a way to classify ventures in the developing contexts. While frugal innovation and the BoP innovation discussions stress the departure in local needs and the usage of local resources as being imperative, the inclusive innovation view is somewhat more pragmatic, presenting mixed configurations. Thus, the distinction local vs global with regard to capacity and needs is not an exclusive one. Technologies and business models may well be combining local and global elements in both dimensions.

Development aid and social responsible investments

As stated above, development aid directed toward countries in SSA has been on the rise, particularly since the formulation of the MDGs in 2000 (cf. Figure 1). The OECD's (2017) Aid at a Glance report breaks down development aid into various commitment categories including education and health, social infrastructure, economic infrastructure, and several more. The “mix” varies across donor countries and receiving regions, but generally, an emerging shift away from more “traditional” targets such as health and basic education toward innovation and capacity building can be observed. Due to the scope of these investments, it is difficult to say anything conclusive about their effect on local capacity development. Drawing on parallels to the innovation studies reasoning on learning and capacity building (Ernst, 2002) we assume that development aid can have a positive impact on local capacity of firms whenever aid-funded initiatives allow that the latter can engage in interactive learning (combining foreign with local knowledge and capacity) and contribute to the development and deployment of technology.

Upgrading: learning and capability building through global interaction

The GVC and GPN literature explains how firms are engaged in cross-border supplier-buyer relations in different stages of value-creating activities in an industry, with emphasis on the context of developing economies and the possibility for these countries to learn and build capabilities in the interaction with global buyers in the GVC (Ernst, 2002; Gereffi, 1999; Humphrey and Schmitz, 2002; Pietrobelli and Rabellotti, 2011). In this literature, the concept of upgrading is central in understanding learning and capability building of local firms in less-developed economies. Initially, Gereffi (1999, pp. 51-52) defined industrial upgrading as “a process of improving the ability of a firm or an economy to move to more profitable and/or technologically sophisticated capital- and skill-intensive economic niches.” In the subsequent empirical studies on upgrading in GVC, scholars used the concept of upgrading in different ways, which led to the fuzziness of the concept. The level of analysis to which the concept is applied is often obscure as the studies discuss upgrading in the value chain or cluster in parallel to upgrading of firms. It is also acknowledged that the concept is used in

different empirical studies both as a synonym for innovation and as the outcome of an innovation process (Morrison *et al.*, 2008).

Empirical studies focusing on the development of less-developed economies through GVC participation have mostly gathered evidence on the upgrading of firms in Asian and Latin American countries. An early seminal work by Gereffi (1999) found that South Korean firms in the apparel industry could upgrade along the value chain and transitioned from original equipment manufacturing to original brand manufacturing through interaction with international leading firms. Gereffi argued that it was possible due to extensive organizational learning and that the lead firms as their buyer had been primary sources of material input and knowledge transfer. However, findings from the subsequent empirical studies suggest that capability building of firms in less-developed countries is observed in the limited areas such as improvement in products and processes in the stages of value chain that they were originally engaged in (Giuliani *et al.*, 2005; Humphrey and Schmitz, 2002; Navas-Alemán, 2011; Schmitz and Knorrington, 2000). These findings imply that upgrading in its most prevalent form is characterized by “incrementality,” meaning that capability building mostly involves incremental learning and knowledge accumulation. Contrary to “incremental” product and process upgrading, moving up the ladder of value chain toward higher-value-added functions is found to be much harder to achieve (Tokatli, 2013). Blažek (2016) goes even further, proposing a taxonomy of downgrading processes and strategies. This suggests that interaction with international lead firms enables learning in certain cases, but it may be restricted to the areas where the developing economies cannot expect to achieve high economic growth. Moreover, in order to manage functional upgrading, the local firms need to have clear strategic intent to overcome potential conflict with international buyers and invest highly on learning opportunities (Lee *et al.*, 2015). Furthermore, it has been argued that such imitation and application of external concepts facilitates the establishment of a domestic knowledge base, which eventually triggers the development of own innovation capabilities (Kim, 1997). This strategy has proven successful in the case of (formerly) emerging economies such as India, China, and Korea to catch up with western industrialized nations. These cases fundamentally differ from most African experiences in a way that they were induced by massive investments and forceful policies by a strong government. In the case of SSA, government budgets as well as regulatory power are often constrained. Here, the application of external knowledge to a large extent took place via FDI investments executed by foreign MNEs. For such externally governed ventures, there exists ample evidence (e.g. Barthel *et al.*, 2011) that knowledge spillovers and local learning are either nonexistent or very limited.

Aside from the “incrementality” argument, there are several assumptions when looking at GVC interaction and effective capability building. The first one being that the foreign technology that local companies are confronted with is actually superior and provides learning potentials in the local context. This is questionable, given that modern products designed for the developed and emerging markets are made to perform in a sophisticated environment both regarding supportive technological infrastructure and the application itself.

Also, despite the obvious power imbalance between MNEs and companies from developing countries, there is an assumption that local firms will be able to gain knowledge trickling down the value chain. Discussing MNEs engagement in frugal innovation Knorrington *et al.* (2016) suggest that such interaction can take any form ranging from benevolent co-creation (between MNEs and local firms) to domination by multinationals, exploitation and crowding out of local competence.

Overall, MNE FDI-type investments can be seen as following a for-profit rationale, where companies in the Global South are expected to participate as suppliers and contributors within value chains, aimed at global needs.

VC internationalization and emerging economies

Western VC investment activities in SSA as an emerging phenomenon that started to take place around 2010 have not received much academic attention so far[7]. The arrival of such investments in countries like Kenya is a positive signal, as it points to the presence of young companies with innovative products, services, or business models which are potentially suited for international or even global markets. In the following, we briefly elaborate on the VC investment model and its possible impact on innovation and economic growth. Then, we survey literature on the ongoing globalization of the VC industry and assess its potential to explain the recent investment activity in Kenya.

VCs are investors providing long-term, unquoted, risk equity finance in the form of a minority stake in new firms, where the primary reward is an eventual capital gain due to increased firm valuation. More specifically, they are financial intermediaries who combine a blend of technological competence and financial skills to provide both financial and managerial support for entrepreneurs in innovative ventures. VCs typically target investments with a high probability of failure but enormous growth potential, so that the few successes overcompensate the losses. To further nurture the invested firm's value, VCs are actively involved in steering and monitoring its further development, and many of them are present in the firm's management board.

It has been widely acknowledged in the literature, mostly with empirical evidence from developed countries, that VCs promote innovative activities (Kortum and Lerner, 2000; Samila and Sorenson, 2010, 2011). To begin with, their market, as well as technological knowledge, enables them to select entrepreneurial ventures with high growth potential (Baum and Silverman, 2004). Moreover, by actively supporting the venture's management, they also contribute to the professionalization of start-ups (Hellmann and Puri, 2002), enable innovative products or services to be rapidly brought to market (Black and Gilson, 1998; Bygrave and Timmons, 1992), and pave the way to the introduction to the stock market (Barry *et al.*, 1990; Maula and Murray, 2002). They also create missing links to other supporting actors such as lawyers, consultants, suppliers, etc., and introduce the entrepreneurs to professional networks (Hellmann and Puri, 2002). Most prominently, the emergence of the VC industry is known for its integral contribution to the rise of the Californian high-tech mecca Silicon Valley (Kenney and Florida, 2000; Saxenian, 1996).

Throughout the past decade, cross-border VC investments have increased substantially, in terms of numbers of deals and capital invested as well as industry and geographical reach (Aizenman and Kendall, 2012; Chemmanur *et al.*, 2016; Guler and Guillén, 2005, 2010). While considered a western economy phenomenon until the beginning of this century, nowadays VC industries and investments became increasingly international, first almost exclusively to be found in advanced economies. Understanding this process to be opportunity driven, the pattern of VC globalization was explained mainly by market attractiveness, an exogenous country-level factor to which VC investments gravitate. In line with this argument, empirical studies have shown that VC investments tend to flow to countries with some key economic features such as high economic growth (Schertler and Tykvová, 2009, 2010), a higher stock of human capital (Aizenman and Kendall, 2012), and fewer barriers to entrepreneurship (Baygan and Freudenberg, 2000). Guler and Guillén (2005, 2010) emphasize the role of institutional factors explaining cross-border VC flows and conclude that VC firms prefer to invest in countries with technological, legal, financial, and political institutions that create innovative opportunities, what they measure by the level of scientific knowledge and technology[8]. Yet the tides changed in the middle of the last decade (Ahlstrom and Bruton, 2006), and some emerging and transition economies such as Brazil (de Lima Ribeiro and de Carvalho, 2008), Taiwan (Saxenian and Sabel, 2008), India (Dossani and Kenney, 2002), and China (Xiao, 2002) succeeded to attract substantial amounts of foreign VC investments[9]. Chemmanur *et al.* (2016) even argue that a large proportion of the latest increase in

international VC is explained by investments into emergent markets, where the number of cross-border VC investments into emerging nations increased from 8.7 percent of the total VC investments in 1991 to 56 percent in 2008.

As the latest of these developments, the VC industry has expanded its reach to Sub-Saharan countries such as Kenya and Nigeria (Gugu and Mworio, 2017). The influx of foreign VC in emergent markets with limited indigenous VC has been said to be an important driver of the upsurge of growth-oriented, technology firms in these regions (Meuleman *et al.*, 2017). However, while we are witnessing the emergence of dynamic start-up ecosystems and rapidly growing domestic markets in these countries (Ndemo, 2017; Park *et al.*, 2017a), they are also characterized by a high degree of political and market instability (Ernest and Young, 2016), underdeveloped investor and property protection (Peng, 2001), corruption (Johan and Najjar, 2010), weak security and basic infrastructure as well as vastly diverging business models, ethics, and practices (Ahlstrom and Bruton, 2006; Dai and Nahata, 2013). As a consequence of the high uncertainty, overseas investments into these countries represent a challenge for western VC investors, requiring them to adjust their routines regarding deal selection (Dai *et al.*, 2012; Hain *et al.*, 2016), structure (Khavul and Deeds, 2016), monitoring, and providing managerial support. More broadly, existing funding models are in need to evolve and emerging funding models to forge new frontiers (Drover *et al.*, n.d.).

Toward a taxonomy of investors and investments

Up to now, we reviewed historical financial flows toward SSA, as well as dominant theories and concept in the literature to explain their rationales and underlying logic, and assess their potential impact on economic development in SSA. A first approximation of investment rationales can be obtained by looking at investor characteristics.

Many countries within SSA are still characterized by a lack of infrastructure in addition to the underdeveloped political and economic institutions. Furthermore, a substantial share of the population still experiences poverty and the associated constraints of basic needs such as appropriate shelter, nutrition, fresh water, medical supplies, and basic education. As a consequence, for most financial flows toward SSA in the first wave, governmental development agencies, NGOs, and private philanthropists made up the major share of “investors.” Among those, it was believed to be conventional wisdom that products and services produced within SSA should primarily aim at satisfying these basic needs. Following this doctrine, the first wave of financial flows toward SSA targeted firms and projects that promised social impact and poverty alleviation measures (OECD, 2017), while potential economic impact and performance was not, or only to a minor extent, considered as an investment criterion. In contrast, the new set of investors observed in the second wave, mainly MNEs, appear to be clearly driven by profit opportunities, either by making use of cheap access to labor and natural resources, or access domestic markets, while social impact did not play a major role for investment decision making. In summary, two distinct drivers of financial flows and investment decisions in the first and second wave can be identified, either for-profit or for-social-impact. During the third wave of financial flows, the activities of VCs are indicative of a continuation of the trend toward profit orientation. Yet, the growing popularity of “impact investment” and “socially responsible investment” practices (Renneboog *et al.*, 2008a, b), where investment opportunities are not solely evaluated by the projected profitability, might also make mixed investment rationales more likely.

In addition to the primary rationales of such investments, mainly determined by investor characteristics, it is also important to consider the characteristics of investment targets, which could be either firms or specific projects. Foremost, we are interested in the markets which are or could potentially be addressed with the products or services provided by the investment target. This does not only indirectly give us an indication of the attractiveness of the domestic market, the capacity of the domestic economy to produce goods, and services

for the world market, but also which population will ultimately enjoy the outcomes of productive domestic activity. These potential markets are basically a function of the potential customers' needs the product or service is supposed to serve, and to which customer preferences it corresponds. Again, while economic growth proceeds and nowadays a solid middle class has emerged in some SSA countries, during at least the first wave of finance flows, a large part of the population was still lacking in the fulfillment of basic needs, such as shelter, food, medical supplies, basic education, and so forth. Theories on consumer behavior (cf. Sheth *et al.*, 1999) suggest that as long as such basic needs are not fulfilled, humans will not strive for the fulfillment of higher level needs, which we associate with western consumer products. Consequently, products and services introduced in SSA had to target this basic needs of a large part of the population with relatively little purchasing power, which is limited to the local context and thereby to a narrow geographical market (or potentially the markets in other LICs). Overall, it turns out rather unattractive for private business activity, which corresponds to the fact that the first almost exclusively foreign development agencies and NGOs without profit aspirations were active in SSA. In the second phase, dominated by MNEs, this "inward orientation" became less-clear cut. While some MNEs used local production facilities to serve SSA markets, for the most part, they aimed to extract resources or produce labor-intensive products for the world market, targeting the needs of advanced economies. In phase 3, it *ex ante* remains a priori inconclusive, which needs and markets the investment targets serve. However, the involvement of international VCs and the economics of these forms of investments indicate that the targets promise high growth potentials to an extend that certainly exceeds any single country market within SSA.

Finally, to utilize foreign investment activity as an indicator of economic development, as well as to discuss their potential impact on domestic competence building, it is also useful to consider the locus of knowledge utilized in the development and production of these products and services and the knowledge base of the investment target. Existing literature on economic development in SSA countries and other LICs so far has mainly been centered around the question, how LICs are able to "catch up" with their advanced counterparts. The literature on GVC and GPN here suggests "industrial upgrading" (Ernst, 2002; Gereffi, 1999; Humphrey and Schmitz, 2002; Pietrobelli and Rabellotti, 2011) as a promising path to go. Here, domestic competence building takes place through the insertion of domestic companies into GVCs of MNEs from the advanced economy, typically at the beginning of the chains with the prospect of executing low-value-added activities. Through the exposure to modern production and organization processes of MNEs, local learning takes place, and domestic suppliers eventually expand their capabilities by taking over higher-value-added activities. In summary, the literature on economic development as a consequence of insertion in GVCs primarily provides us with useful insights how inter-firm knowledge transfer from developed countries might lead to local competence building. This appears to be consistent with our observations in the first and second waves, where knowledge transfer took place mainly unidirectional toward SSA, and consequently, the knowledge and capacities utilized in the investment targets primarily originating from advanced (western) economies. This can be observed in foreign-orchestrated activities by MNEs in SSA, but also foreign planned aid-like infrastructure and social impact projects. However, it is not clear if this is also the case for the recent third phase of financial flows toward SSA. The VC literature clearly suggests such investments to target knowledge-intensive entrepreneurship, which is likely to at least to some extent draw from local capabilities. Furthermore, the global expansion of VC, in LICs and elsewhere, appears to gravitate toward large market opportunities, but even more global centers of excellence with specific advantages of the local knowledge base. While the technological capabilities and scientific knowledge base of most SSA countries certainly is not *au pair* with most of their

western counterparts, literature on frugal innovation (Radjou *et al.*, 2015; Rao, 2013; Tiwari and Herstatt, 2012), BoP (Bhatti, 2012; Zeschky *et al.*, 2014), and inclusive innovation (Chataway *et al.*, 2014; Foster and Heeks, 2013) offers explanations for potential local advantages of the knowledge base in SSA. Notably, it highlights the importance and potentials of integrating local perspective and capability when developing products and services for the BoP markets as well as for the rapidly growing middle class in LICs.

We summarize the above discussion in Table I, which relates the two phases of finance inflows to the conceptual elements that we identify in the literature: investment rationale, the predominant locus of capacity, the predominant locus of needs and markets.

4. Analysis

Methodology

In this paper, we aim to shed light in the emergence of high-tech entrepreneurship – mainly centered around the digital economy – in Kenya, where we particularly highlight the historical shift of finance supporting such ventures, as well as these ventures’ capabilities applied and markets served. To do so, we first reviewed the historical development of economic activity within, and international finance flows to, SSA. To do so, we mainly focus on the analysis of investment activity, serving as a forward-looking measure of development potential (Christensen and Hain, 2017).

In this section, we carry out a qualitative-exploratory analysis of domestic entrepreneurial activity and foreign investments in Kenya. Such a methodological approach is well suited for new phenomena, where not much research or theory exist (Eisenhardt, 1989). We proceed in the following way: we first gather recordings on foreign investments in Kenya, the investors, and the targeted ventures, which we enrich in a desk research manner with qualitative information by consulting company websites, business reports, national and international news articles, social media presence, country experts, etc. Given the newness of the phenomenon and relative absence of prior research, a qualitative methodology allows us to process richer and more nuanced data sources than a quantitative methodology (Marshall and Rossman, 2014). We use a content analysis approach to draw systematic inference from the qualitative data. Thus, we apply the concepts derived from the literature discussion to classify the identified investment-ventures and investors. More specifically, we classify investors as “for-social,” “for-profit,” or a mixed form. “For-social” investors explicitly point to the importance of social impact in their activity, e.g., the improvement of livelihoods of smallholder farmers. The investment-ventures were classified along the dimensions competence (local vs global), explicit social focus, the locus of the addressed problem/demand (local and/or global). Many of the companies would, for instance, emphasize on their websites that they are offering Kenyan solutions for Kenyan problems. To deepen the contextual understanding, we add a set of informative mini-case studies on selected ventures and investors. Finally, we explore the network structure within and between investors and targeted ventures, focusing on the interplay between different types of investors and their investment targets.

Table I.
Conceptual
dimensions and the
first two phases of
finance flows

	First phase: development aid	Second phase: MNE investment
Investment rationale	Explicit social impact	Explicit profit orientation. Sometimes market seeking; however, not explicitly targeting the specific needs in LICs
Locus of capacity	Mainly global, particularly on the technology side	Mainly global
Locus of needs and markets	Local needs in developing countries, often without market orientation	Primarily global needs

Data

CrunchBase (CB) was by the time of data collection the open, community-curated database of TechCrunch – currently containing profiles of 650,000 companies, investors, and people around the world – with detailed activity and technology descriptions. According to its statements, CB has two million monthly users and around 50,000 active contributors, editing the database in a peer-review type process. In addition to providing well-structured entity profile information, the graph architecture of CB allows us to extract multi-modal networks between all contained entities, such as company-funding round-investor, employer-employee relations or even personal networks. CB provides access to the data over a JSON REST API[10]. For the present study, we constructed a data set by crawling the graph structure of CB, starting with all listed tech start-up companies in Kenya (186, of which 23 have documented investments in CB) as well as their listed investors.

For these, we selected all mentioned investors (42) and extracted data on all companies in their portfolios (ca. 230). We also collected data and connections of second-level investors, i.e. companies that co-invested with investors from our initial list.

Investments

Given the character of CB, the sample of investments is naturally biased toward IT and other technology-intensive companies. CB has many features of a social network page and a company's presence in the worldwide accessible and searchable database indicates a clear outreach-intention by the start-up toward potential investors, customers, and the media. The above-mentioned community model of CB guarantees a certain level of data reliability and selection of companies. For all that, we expect the CB listed firms from Kenya to be young, innovative, technology-intensive ventures. In fact, over 75 percent of Kenyan firms that we find and that have received funding were founded in 2010 or later.

The complex hybrid nature of organizations renders a clear delineation of the companies fairly challenging, particularly if merely departing from structured classifications. CB's sectoral categories are very detailed and reflect well the extreme dynamics of technological change. Yet, they lack a hierarchical structure as it is known in traditional industrial classification (e.g. NACE). This makes it complicated to aggregate them in a way that allows us to compare sectoral specialization across firms in different countries. Two interesting and apparent observations from such a comparison are that the most often appearing category selected by financed start-ups in Kenya is "Clean Technology." When looking at other companies financed by the same investors outside Kenya (and excluding the USA), we find many businesses working with innovative finance solutions and particularly Bitcoin. Also high ranking on the list are the categories (once again) "Clean Technology," "Mobile," and "Education."

For all that, these observations do not allow us to draw any conclusions that could help with explaining what particularly makes the Kenyan companies attractive for the international funding that we identify in the database. Relying on the classification framework – presented above – we evaluated the Kenyan companies, using information from the companies' websites, journalistic texts and online available videos, tweets, and other social media. Categories were all non-exclusive, meaning that for each company multiple categories could be selected. Table II provides an overview of the analyzed company cases and our classifications.

In terms of "addressed needs," we find that in 19 of the 23 cases, companies target problems that are typical for LICs, emanating from insufficient infrastructure and unreliable institutions. In six of these cases, we found however that the products developed by the companies could be transferred, adapted, and used in developed countries, offering a leaner and smarter solution than the technologies in place.

Table II.
Overview: Kenyan
companies with
investments in
the database

Company	City	Year founded	Needs developing	Needs advanced/global	Social focus	Local competence	Description
iProcure	Nairobi	2013	○	●	○	○	Logistics and distribution platform
SafariDesk	Nairobi	2012	○	●	○	○	Hotel management software
Angani	Nairobi	2013	○	●	○	○	Cloud computing provider
Sanivation	Naivasha	2011	●	○	●	○	Sustainable slum sanitation systems
Futurepump	Nairobi	2011	●	○	●	○	Solar water pump for smallholder farmers
Shelter Afrique	Nairobi	1982	●	○	○	○	Social housing
BookNow	Nairobi	2011	●	○	○	●	Bus booking app
Ojay Greene	Nairobi	2013	●	○	○	●	Innovative agriculture delivery models
Wanda Organic	Nairobi	2012	●	○	○	●	Organic fertilizers
Bridge International Academies	Nairobi	2007	●	○	○	●	Affordable private schooling system for BoP
Wananchi Group	Nairobi	2008	○	●	●	●	Affordable entertainment and connectivity
Africa's Talking	Nairobi	2010	●	○	○	●	Advanced SMS-based services
Civicon	Mombasa	1975	●	○	○	●	Infrastructure construction
Lipisha	Nairobi	2009	●	○	○	●	Corporate mobile payment platform
M-Farm	Nairobi	2010	●	○	○	●	Smallholder farming mobile information system
Virtual City	Kalimoni	2002	●	●	○	●	Data analysis and coordination
WindGen Power Products	Nairobi	2011	●	○	○	●	Small wind and solar
M-Changa	Nairobi	2012	●	○	○	●	Mobile fund-raising platform
eleni	Nairobi	2013	●	○	○	●	Commodity exchange
Sanergy	Nairobi	2010	●	○	○	●	Sustainable slum sanitation systems
Ushahidi	Nairobi	2008	●	●	●	●	Virtual crisis mapping
BitPesa	Nairobi	2013	●	●	○	●	Connect Bitcoin and Kenyan mobile payment systems
BRCK	Nairobi	2013	●	●	○	●	"Off-grid" mobile WiFi
Total			19	10	7	18	

BRCK emerged around 2013 as a spin-off project of the makers of Ushahidi – which in itself is another Kenyan IT-success story – as a “backup generator for the internet.” A Kickstarter campaign in May 2013 raised over 170,000 USD and was pledged by over 1,000 backers. On their blog, they wrote in December 2014: “As a Kenyan company based in Nairobi, we know first-hand the challenges of dealing with power cuts. So we built a router that stays online when the lights go out.” BRCK is essentially a self-powered WiFi router designed to deal not only with power cuts but generally to provide internet connectivity in extreme conditions. The device connects to the internet by Ethernet cable, bridging other WiFi signals, or accessing 3G or 4G mobile data connections once a data-activated SIM card is plugged in. The device is power efficient and can be charged by connecting it to anything from a standard power outlet to a solar panel or even a car battery. While it is suited for rough outdoor conditions, solutions like BRCK are becoming essential for young upstarts in Nairobi that are challenged by intermittent electricity and internet breakdowns. Developed countries are not suffering from these problems, yet BRCK can still be used in special situations such as vacation houses in remote areas without internet connection, outdoor/trekking, or at (sporting) events organized outside, which could benefit from a common WiFi connection. As of today, BRCK has the highest number of investors of all companies in our sample.

Some of the companies are targeting problems that are exclusively characteristic for developing economies. These companies are often coming up with innovative solutions for problems within the agriculture sector but also to overcome problems imposed by the lack of basic infrastructure – for instance, energy and sanitation.

Futurepump was started in 2011 with the idea to provide a sustainable and affordable pump to smallholder farmers around the world. Its product, The Sunflower, is a robust and portable solar irrigation pump that is aimed at seasonal vegetable farmers and provides an alternative to traditional petrol or diesel pumps. On its website, Futurepump emphasizes that actually, the potential market for their product goes far beyond Kenya and Africa, as there are hundreds of millions of small one-acre farms around the globe that face similar problems. In December 2014, after winning the Agriculture Innovation award, the company received seed funding from VilCap, a San Francisco based business accelerator with great experience in supporting entrepreneurs in less-developed countries. Today the pump costs approximately 400 USD, and the company offers payment plans. The next years will show whether Futurepump can also find a sustainable business model solution, which allows us to diffuse their innovation and improve it through interaction with their customers.

Sanergy’s goal is to make hygienic sanitation affordable and sustainable in high-density urban slums in Kenya. The company was founded in 2010 by four MIT students. Sanergy combines lean technology in the form of their modular pay-per-use Fresh Life Toilet with an innovative franchise business model. The local operators are responsible for cleanliness of the units and waste disposal, which is turned into organic fertilizer and renewable energy in central facilities. According to Sanergy’s webpage to date, nearly 700 toilets have been installed in informal settlements. Including the company’s team, local operators, and their employees, nearly 700 jobs have been created.

Four other cases are companies that offer products for solutions to problems typically found in developed economies.

When looking at the competence bases used within the companies, from our desk research based analysis, we find that 18 companies are actually, to a high degree, building on local competence bases. These firms were founded by locals, have a large share of local employees, and rely – to some extent – on locally developed or adapted technology.

International investments in less-developed economies have, throughout the last few decades, often been associated with aid, thus assuming some kind of direct social impact. Within our sample, we identify only seven firms (under a third of the sample) that develop products and services that have social character, meaning that they intend to directly improve the living conditions of primarily people at the BoP. All other firms develop mostly highly technological solutions, without aiming at direct social impact.

Investors

For a first overview, Figure 3 illustrates the location of the different foreign investors engaged in financing start-ups in Kenya. Furthermore, Table III provides some information and Table IV some further descriptions of the 42 identified investors who are involved in Kenyan technology-intensive ventures in the last decade. Most of them are indeed VCs or similar equity investors – plus some foundations, western development



Figure 3.
Location of investors
(outside Kenya)
and investments
(in Kenya)

Note: Geographic coordinates obtained through geocoding of organization addresses using the Google Maps Geocoding API, visualization with Leaflet (<http://leafletjs.com>) and OpenStreetMap as base layer

Name	City	Country	Founded	Type	Inv. range	For-profit	For-social	Inv. total	Inv. Kenya
Peery Foundation	Palo Alto	USA	1978	VC/foundation	25k-1m	●	●	12	2
East Africa Capital Partners	Nairobi	Kenya	2002	VC	15m	●	○	1	1
HIVOS	The Hague	The Netherlands	1968	VC	100k-15m	●	○	1	1
Humanity United	San Francisco	USA	2005	VC	200k	●	●	1	1
Sarona Frontier Markets	Canada	USA	1953	VC	55m	●	○	1	1
Pantera Capital	San Francisco	USA	2014	VC	100k-15m	●	○	4	1
imphac	Nairobi	Kenya	2011	VC	25k-1.5m	●	○	5	1
Future Perfect Ventures	New York	USA	2013	VC	1-30m	●	○	5	1
Bitcoin Opportunity Fund	San Francisco	USA	2012	VC	250k-12m	●	○	6	1
Liberty Global Ventures	Englewood	USA	2005	VC	2-60m	●	○	9	1
TomorrowVentures	Palo Alto	USA	2009	VC	2-40m	●	●	9	1
Urban.Us	Miami	USA	2013	VC	200k-2m	●	○	9	1
Better Ventures	Oakland	USA	2010	VC	20k-1m	●	○	10	1
Rethink Education	White Plains	USA	2012	VC	2-15m	●	●	10	1
Crypto Currency Partners	San Francisco	USA	2012	VC	500k-20m	●	○	14	1
Emergence Capital Partners	San Mateo	USA	2003	VC	500k-100m	●	○	14	1
Savannah Fund	Nairobi	Kenya	2012	VC	25-500k	●	●	7	2
Invested Development	Boston	USA	2009	VC	500k+	●	●	11	3
ViiCap Investments	San Francisco	USA	2014	VC	50k+	●	●	12	4
Nokia	Helsinki	Finland	1865	MNE	50k-25m	●	○	9	1
Cisco	San Jose	USA	1984	MNE	2-65m	●	○	12	1
Omvestments	San Francisco	USA	2013	Micro VC	1m	●	○	1	1
Synergy Growth	New York	USA	2010	Micro VC	1-2m	●	○	2	1
Openheimer & Co., Inc.	New York	USA	1950	Investment bank/ management	50m	●	○	2	1
Stephens Investment Management	San Francisco	USA	2001	Investment bank/ management	1-15m	●	○	2	1
Morgan Stanley	New York	USA	1935	Investment bank/ management	5m-1b	●	○	11	1
Startupbootcamp	London	USA	2010	Incubator/ accelerator	15-100k	○	○	8	1

(continued)

Local
competence
buildingTable III.
Investors active in
Kenya – indicators

Table III.

Name	City	Country	Founded	Type	Inv. range	For-profit	For-social	Inv. total	Inv. Kenya
MassChallenge	Boston	USA	2009	Incubator/ accelerator	50k-2.5m	○	●	9	1
Start-Up Chile	Santiago	Chile	2010	Incubator/ accelerator	40-100k	○	●	13	1
Safaricom Foundation	Westlands	Kenya	2003	Foundation	250k	○	●	1	1
Knight Foundation	Miami	USA	1950	Foundation	500k-50m	○	●	10	1
CDC Group	London	UK	1948	Development bank	5-350m	○	●	7	1
KFW	Frankfurt	Germany	1948	Development bank	500k-50m	○	●	8	1
International Finance Corporation	Washington	USA	1956	Development bank	3-650m	○	●	12	1
Africa Angels Network	Johannesburg	South Africa	2014	BA/micro VC	3m	●	○	5	1

Name	Description
Peery Foundation	Invests in early- to mid-stage social entrepreneurs who are effectively addressing the issues of poverty. Also offers grants for social impact projects
East Africa Capital Partners	Technology, media, and telecommunications sector focused venture capital fund manager investing in the greater Eastern Africa region
HIVOS	Venture capitalist that also does grants for social impact projects
Humanity United	Micro VC doing seed. Committed to building a world where modern-day slavery and mass atrocities are no longer possible
Sarona Frontier Markets	VC and PE investor in frontier and emerging markets
Pantera Capital	Investment firm focused exclusively on Bitcoin, other digital currencies, and companies in the space
88mph.ac	Invests in early-stage web and mobile companies in the African market
Future Perfect Ventures	Early-stage venture capital fund partnering with entrepreneurs who are humanizing data
Bitcoin Opportunity Fund	Bitcoin Opportunity Fund is an investment vehicle for bitcoins and 20 bitcoin-related companies
Liberty Global Ventures	Global investment fund owned by Liberty Global, the largest cable company outside of the USA
TomorrowVentures	Opportunistic investment firm with a focus toward seed and early-stage venture capital investments that develop innovative ideas that have the power to change the way people live, interact, and thrive
Urban.Us	Seed investor and advisory network for start-ups that are helping solve urban challenges in areas such as transportation, mobility, sustainability, governance, and public safety
Better Ventures	VC and accelerator. Funding and support to technology start-ups building innovative solutions to big and important problems, from work and education to health and sustainability
Rethink Education	Venture capital fund focused exclusively on education technology that invests in early- and growth-stage start-ups
Crypto Currency Partners	Professional investors and entrepreneurs driving innovation in the blockchain ecosystem
Emergence Capital Partners	Leading venture capital firm focused on early and growth-stage enterprise cloud companies
Savannah Fund	Seed capital fund specializing in early-stage high growth technology (web and mobile) start-ups in Sub-Saharan Africa. Initially focused on East Africa, the fund aims to bridge the early stage/angel and venture capital investment gap that currently exists in Africa
Invested Development	Invest in seed-stage start-ups in emerging markets. Yet, it also provides growth capital. Targets technology solutions to the world's biggest problems, impact investment
VilCap Investments	Dedicated to investing in global entrepreneurs and offering investors a portfolio of companies addressing social and environmental challenges
Nokia	MNE engaged in the manufacturing of mobile devices, network infrastructure, location-based technologies, and advanced technologies businesses
Cisco	US origin MNE that designs, manufactures, and sells networking equipment
Omvestments	BA/micro VC that does seed investments
Synergy Growth	Micro VC that does seed investments
Oppenheimer & Co., Inc.	Investment bank and full-service investment firm that provides financial services and advice to high net worth investors, individuals, businesses, and institutions
Stephens Investment Management	Financial investments: hedge funds, sector-focused venture funds, an income fund, a real estate fund, a fund-of-funds, and private company direct investments
Morgan Stanley	Morgan Stanley Venture Partners manages a group of private equity funds which invest in high growth companies, concentrating on the technology and health care industries

Table IV.
Investors active in
(continued) Kenya – descriptions

Table IV.

Name	Description
Startupbootcamp	Global network of industry-focused start-up accelerators that provides investment and mentorship services
MassChallenge startUp Chile	Accelerator providing grants. Largest-ever start-up accelerator and competition Program of the Chilean government to attract high-potential entrepreneurs to bootstrap their start-ups in Chile
Safaricom Foundation	Foundation provides a formal process for charitable contributions to communities, community groups and NGOs in Kenya
Knight Foundation	Supports transformational ideas that promote quality journalism, advance media innovation, and engaged communities
CDC Group	The UK's Development Finance Institution (DFI) wholly owned by the UK Government's Department for International Development
KFW	Promotional bank under the ownership of the German Federal Republic, support to encourage sustainable improvement in economic, social, ecological living and business conditions
International Finance Corporation	Fosters sustainable economic growth in developing countries by financing private sector investment, mobilizing capital in the international financial markets, and providing advisory services to businesses and governments
Africa Angels Network	Invests in Africa-focused start-ups, primarily in the tech sector

banks, and two MNEs. Over half of these investors (24) are located in the USA, mostly clustered in the Californian San Francisco Bay Area around Silicon Valley (San Francisco, Palo Alto, San Mateo).

Interestingly, we observe many investors who are active in the Kenyan investment landscape to be specialized in very particular technological fields, mainly centered around mobile payments, digital currencies, and renewable energy technologies. The following example illustrates the case of such a highly specialized investor.

Pantera Capital Management LLC is a San Francisco based investment management firm, which, until recently, focused on global macro hedge fund investments. Believing blockchain technology and the associated crypto currency ecosystem to be the enabler of disruptive future applications that will fundamentally change the internet and the digital economy, they now shifted their investment focus completely to this area.

Their investment portfolio includes not only new solutions to encrypt, secure, transfer, and trade crypto-currencies, but also the integration of crypto-currencies in mobile payment and the like. Examples from their investment portfolio are the bitcoin social media microtransaction platform “Changetip” and “BitPesa,” a Kenyan remittance platform that employs the bitcoin payments system to offer an easy way to send money to East Africa. Prior to founding Pantera Capital in 2003, CEO Dan Morehead worked in a leading position at Atriaux, an electronic foreign exchange platform.

In line with our classification provided in Section 3, we distinguish between for-profit- and non-profit-oriented investors. While the for-profit investors mainly consist of VCs and investment banks or capital management firms, in the non-profit sector we find mainly charitable foundations and two European development banks (the German KFW and the UK CDC). Yet, we find that this classification is not fully capturing the rationales of investors in our sample. While non-profit investors, almost by definition, focus on the social impact rather than the economic profits of their investments, the opposite is not necessarily

true for for-profit investors. Among the most active for-profit investors in our sample, we find organizations which highly emphasize the social impact of their investments. Furthermore, we find some mixed for- and non-profit investor-constellations, like grant-awarding foundations that are associated with a for-profit investment firm, or VCs that also award grants. Therefore, in Table III we also distinguish between firms that place a high (though not ultimate) emphasize on the social impact and not only on the profitability of their investments, independent of their legal form. We identify such firms by their governance structure, the profile of their investment portfolio as well as their mission statements. The following example provides an illustration of such a mixed for- and non-profit investor.

VilCap Investments, LLC is a San Francisco based for-profit VC investment fund associated with the non-profit organization “Village Capital,” a business incubator and accelerator. Village Capital trains early-stage ventures tackling major global problems in agriculture, education, energy, financial inclusion, and health in intensive training programs around the world. These acceleration programs are designed as problem based, meaning they focus on specifically announced problems which have to be tackled by the participants. Examples are “Edupreneurs to reduce the education gap in India” and “Leveraging ICT and web-technology to solve urban challenges of Nairobi.” “VilCap Investments” in turn invests in the top peer-ranked company of the 35 programs executed in nine countries (among others in Taiwan, India, Kenya, and Tanzania) so far, where the amount invested ranges from 25,000 to 2.5 million USD. For their combination of non-profit social impact and for-profit economic impact, Village Capital was awarded with the Harvard Business Review/Mckinsey M-Prize for Management Innovation in 2013. Their current investment portfolio includes AsthmaMD which gathers anonymous asthma data to facilitate asthma detection and intervention research, and Futurepump – a Kenyan company that develops low-cost solar-powered irrigation technologies for one-acre farmers (see mini-case above).

Aggregated interplay: investments and investors

Figure 4 visualizes the aggregated investment patterns in our sample, with investor types on the left and classified investments on the right, separated by their identified knowledge source and potential markets served by them. The graph exhibits the extent to which various types of investors support certain types of ventures, according to our classification[11]. It is obvious that there is a bias toward for-profit investors in the CB data set. However, it is an interesting observation that almost half of the identified investors have an social impact focus, independent of their legal form (for-profit vs non-profit).

As suggested by the existing body of literature and our historical analysis, non-profit investors tend to focus on financing ventures that mainly deploy local competences and serve the needs and markets of the developing world, while for-profit investors lean toward ventures with more global competences that also target global markets. Socially oriented for-profit investors settle somewhere in the middle, indicating no clear tendency for particular types of investments. However, within our sample, the main share of investments flows toward ventures that leverage a combination of global and local knowledge and competences, and also address advanced as well as developing markets and their corresponding needs. Within this category, for-profit investors dominate. As suggested earlier on, this might be a first sign for a growing local capacity to tap from global knowledge sources and utilize them to serve problems which are to some extend context specific, yet have the potential to be

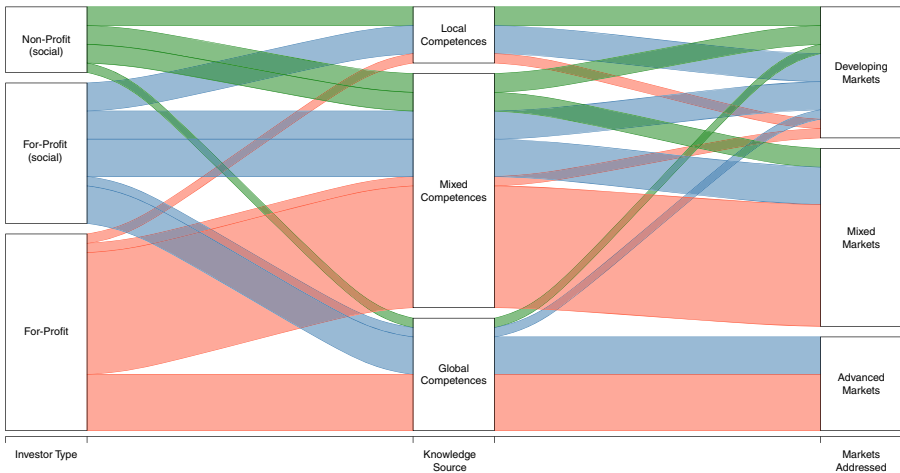


Figure 4.
Alluvial diagram:
investor type with
target characteristics

Notes: Alluvial diagram, illustrating the share of investments of investor types by targets characteristics (knowledge source and addressed markets/needs). Illustration created using the “Alluvial” package (<https://cran.r-project.org/web/packages/alluvial/>) in the statistical programming environment R

developed toward serving global markets. This is revealed particularly by investment activity of foreign for-profit VCs, which not necessarily have an incentive to create social impact, but rather identify investment opportunities with high growth potential. This illustration also hints toward the importance of a plurality and a mix of funding sources and investors with different rationales to create financial systems that foster social impact as well as economic growth in future industries and entrepreneurial ecosystems (Hain, 2016).

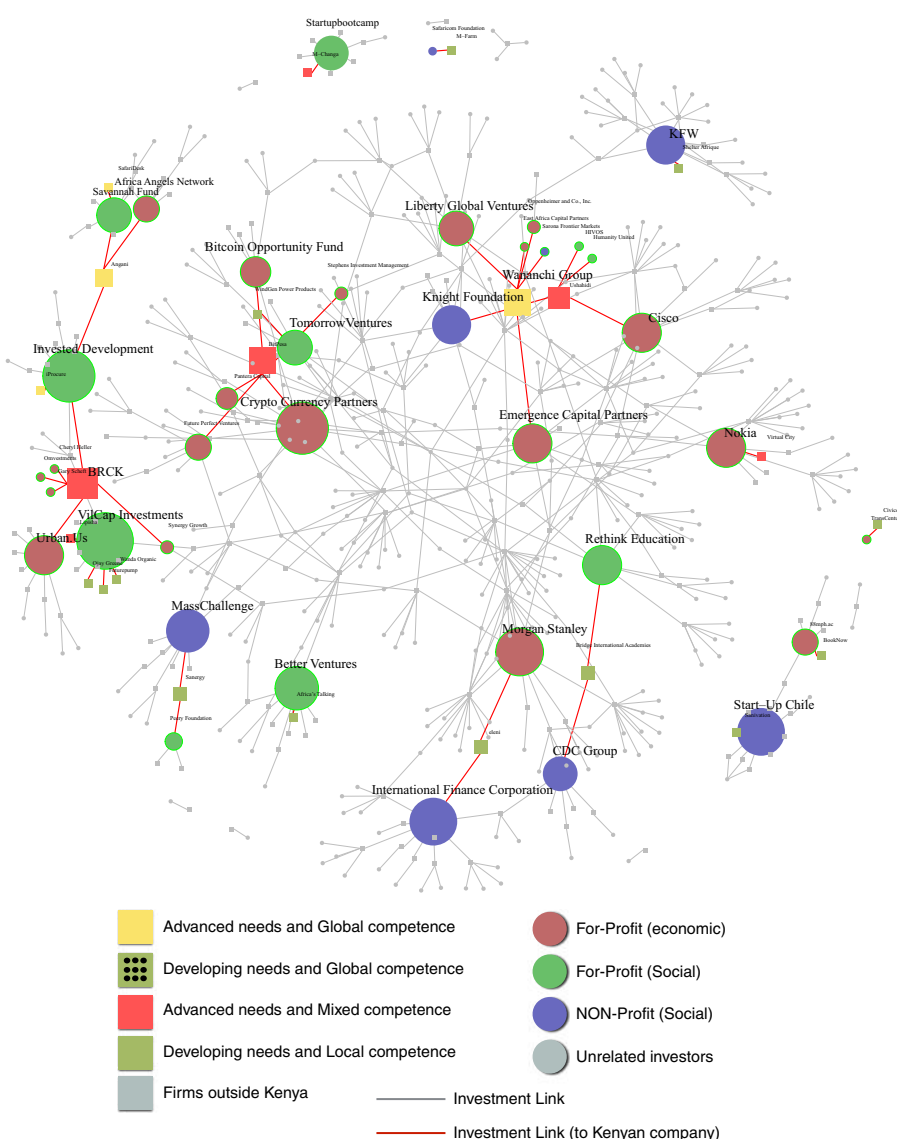
In Figure 5, we plot a network between start-ups and investors, where we again highlight the interplay between non- and for-profit investors with the competencies applied and needs served by the investment targets. It illustrates that profit-oriented investors primarily target start-ups which serve global (advanced) needs and markets, and apply local or a mix of local and global knowledge and competences. Furthermore, we clearly see profit-oriented investors and correspondingly start-ups with products and services to supply a global market to be in more central positions, while the less interconnected non-profit investors tend to be located in the periphery.

5. Discussion

In the previous section, we analyzed recent investments in Kenyan start-ups, which we categorized according to the nature of capabilities, skills, and knowledge applied, and the needs and thereby potential markets they might serve. Within the data we can identify a number of Kenyan technology start-up cases that became success stories, generating “high-quality” employment opportunities, income, and have attracted international attention and investments. In this section, we take stock of what we observed, provide what we believe to be a helpful taxonomy of investments and investors in LICs to set a foundation for further investigation, and raise open questions to be addressed in future research.

A proposed classification of investments and investors in LICs

When comparing historical finance flows toward SSA, as depicted in our background section, with current activities illustrated in our analysis, we see stark differences regarding



Notes: Gray nodes are other connected organizations (co-investors and investments outside Kenya), which influence the networks structure but are not analyzed in detail in this study. The size of the nodes is determined by their degree centrality. The illustration was created using the “Igraph” package (<https://cran.r-project.org/web/packages/igraph/>) in the statistical programming environment R

Figure 5.
Investment network
between Kenyan firms
and their international
investors

their qualitative characteristics. We here focus on the differences between the origin of applied knowledge and capabilities, as well as the potential to serve local or global markets. In particular, we contrast current technology, and growth-oriented investments mainly carried out by VCs with previous ones, commonly showed aid characteristics (meaning they

prioritizing social over economic impact) and were based on models, logic, and knowledge “imported” from advanced countries. While there is nothing wrong with aid and the associated focus on the social impact of investments as such, a predominance of aid-like investments clearly signals either the perceived lack of attractive for-profit investment targets or strong barriers (institutional, regulatory, cultural, etc.) for such activity.

Equally, a high share of investments applying external knowledge (FDI by MNEs) indicates a perceived lack of local capabilities. Competitive international VC investments in Africa may mark a turning point in the perception of business opportunities in Sub-Saharan countries. This new mode of investment activity signals the existence of attractive for-profit investments which often utilize local capacity, and may have the potential to become competitive on global markets. Up to now, one dominant perception was that the world has to solve SSA’s problems; we now see the opposite begin to emerge.

To sum up, we find foreign investments in low-income economies to mainly differ in three dimensions. First, from a knowledge perspective, we distinguish between investments that target the utilization of local (indigenous) or investments that are mainly based on foreign knowledge, skills, and capabilities. Finally, from a market perspective, the purpose of such investments can be either to meet local or global needs and therefore markets. With local, in this case, we merely distinguish between the needs associated with resource-constrained and infrastructure-poor LICs, while global ones are the needs and markets of advanced mid- and high-income economies. Here, overlaps are possible in a way that products and processes developed to solve problems in a local low-income context over time prove to be also suitable to meet the demands of mid- and high-income economies.

Figure 6 illustrates of the discussed dimensions and resulting taxonomy of investments in SSA, and more generally LICs.

Certain combinations of states in these dimensions can be expected to be more or less interesting for particular types of investors. Obviously, investors like foundations, NGOs, and private philanthropists will favor the social over the economic impact of their investments, and most professional investors and private enterprises may focus on the opposite. Investors aiming at “doing good” will target investments solving the needs of LICs, while investors with particularly high-profit aspiration, such as VCs, will prefer investments that are able to address needs – and therefore markets – with high margins, hence advanced economies. While activities of social impact investors indicate the perceived global need to support the

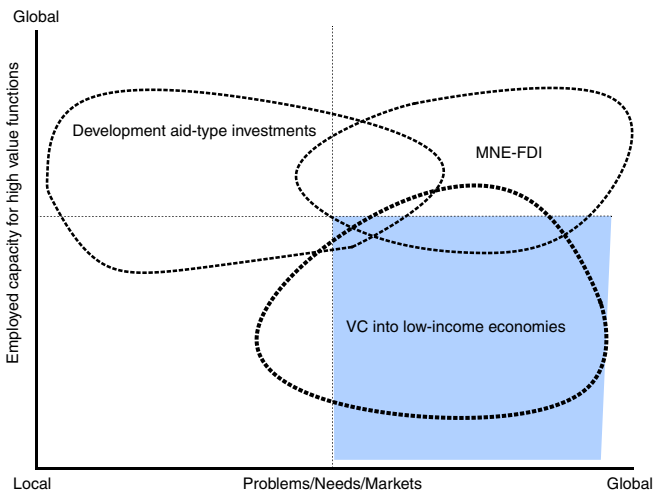


Figure 6.
A taxonomy of
investors and
investments

development in SSA, profit-oriented investors tapping into Kenyan capabilities can be interpreted as a sign of promising local technology-intensive entrepreneurship. Furthermore, the activity of such investors and the associated supply of risk capital might lead to further demand for it – signaling local entrepreneurs of possibilities to get such ventures financed. However, without initial demand for VC investments, meaning the existence of high-potential technology-intensive entrepreneurship, neither the activity of international VCs nor the emergence of a domestic VC industry is likely to occur (Avnimelech *et al.*, 2006; Avnimelech and Teubal, 2008).

What such investments have in common is that the products, facilities, or practices they create are based on knowledge and capabilities developed in advanced economies, and then are more or less adapted to the local (low-income) context. When NGOs provide medical supplies or set up education centers as part of an aid program, or MNEs set up production factories for profit reasons, the organization is often guided by the logic of advanced (western) economies with the implicit assumption that the receiving countries neither have the resources nor capabilities to manage such projects on their own [12]. For all that, the latest developments indicate that investors started to target activities that aim to utilize local knowledge developed in a low-income context.

Following the assumption that low-income economies very well possess the capabilities to tackle their own problems but lack the resources to do so, profit- as well as non-profit-oriented investors started to search for creative ideas developed inside SSA to either tackle local social problems or provide products and services. Business accelerators such as the San Francisco based Village Capital or The Aspen Network of Development Entrepreneurs are examples of such organizations that identify and, in different ways, support upstarts in developing countries around the globe.

Yet, there are also first indicators that such local developments eventually prove as well suited for developed markets. In other words, the limiting conditions of such environments characterized by low purchasing power and lack of infrastructure and resources might, in some cases, ultimately be enabling factors triggering creative solutions for global markets.

Open questions, and a proposed research agenda

In this exploratory analysis of the emerging entrepreneurial ecosystem of Kenya and the current involvement of global VCs, we emphasize the interaction between start-up characteristics and investor rationales and highlight the substantial shift investments in SSA and notably Kenya have undergone during the last few decades. This phenomenon is worth further investigation and raises a set of related questions:

- (1) What created the conditions for such technology-intensive entrepreneurial activity and their recognition by the international VC and tech-investor community?
- (2) What are the implications of international VC presence in Kenya? And related to that point?
- (3) How can policy support and shape this development?

In this study, we aim at identifying and characterizing various types of international finance flows into technology-intensive start-ups in Kenya, and fully answering the above questions is probably beyond its scope. Nevertheless, in the following, we attempt to provide some first intuition.

First, what triggered the emergence of entrepreneurial, technology intense clusters in Kenya? We know from the literature on innovation systems (e.g. Carlsson and Stankiewicz, 1991; Lundvall, 1992; Nelson, 1993) that such innovation capacity does not emerge in a vacuum, but is nurtured by – and grown through – interaction with customers, suppliers, and the public sector. In fact, we see a set of policies put into place in this century, aiming at

facilitating the development of the Kenyan ICT sector. For instance, the national ICT Strategy issued by the government in 2006 places particular emphasis on unleashing the enormous potential of this industry through privatization of telecommunication and infrastructure investments (MoIC, 2006; Zavatta, 2008). Furthermore, the new Kenyan constitution approved in 2010 includes a bill of rights provisions on fundamental rights and freedoms of access to, and use of, information and communication infrastructure and content (MoIC, 2011; Waema and Nd'ung'u, 2013). The resulting increase in the national, as well as the international, private sector[13] activity of network operators has generally stimulated the ICT sector but more importantly triggered the building up of ICT infrastructure and associated improvements of stationary and mobile access to telecommunication and the internet. Furthermore, increased diffusion of electronic devices, such as mobile phones, leads to growing market and impact possibilities for ICT businesses as well as "learning by using" among the population, and user-producer interaction. Together with increasing quality and quantity of general university (Gudo *et al.*, 2011), and particularly ICT-related education (Kinuthia, 2009) in urban Kenya, this seems to have led to a critical mass of knowledge and capabilities for such sectors to emerge. Our intuition – supported by a growing body of literature (Bramann, 2017; Drouillard *et al.*, 2014; Gathigi and Waititu, 2012; Kelly and Firestone, 2016; Marchant, 2015; World Bank, 2016) – is that recent developments within ICT have begun to enable African entrepreneurs to come up with sophisticated technological solutions to problems their societies are facing. This makes these solutions attractive for the world market as they can be used context-independently – "If it can work in Africa – It can work anywhere"[14].

This leads us to the second question, what are possible implications of increasing foreign VC activity for Kenyan technology-intensive entrepreneurship and the economy as a whole? It has been highlighted (e.g. Zavatta, 2008) that when turning this competences into practice, Kenyan start-ups and SMEs – particularly in the ICT sector – face high barriers in raising capital (Bramann, 2017). Traditional banks are wary of lending to SMEs and demand heavy securitization of personal assets in risky and not fully understood sectors, while newer financial instruments such as microfinance usually offer small amounts of capital and target other sectors. Yet, firms in the digital economy require relatively low upfront investments as compared to manufacturing industries, and have the added bonus of running business models that are highly scalable. This configuration has proven manifold in other places that it very well fits the model of VC which provides equity-based finance of risky but potentially high growth enterprises. VC investment schemes have neither proven to be the holy grail of industrial and innovation policy, nor a necessary condition for the establishment of vibrant high-tech sectors[15]. For all that, a large body of evidence from developed countries demonstrates that, given the proper institutional setup, the activity of VCs not only promotes innovative activities in general (Kortum and Lerner, 1998, 2000; Samila and Sorenson, 2010, 2011), but also provides additional value-added support to enable innovative products or services to be rapidly brought to the market (Black and Gilson, 1998; Bygrave and Timmons, 1992).

The main contribution to innovation attributed to VC activity can be summed up into three components: First, they influence the selection environment by shaping capital markets in favor of growth-oriented but risky perceived ventures. Second, they add value to the invested companies by managerial support. Third, they introduce the supported ventured to their usually well-developed networks of firms, other finance sources, and facilitating business services (Baum and Silverman, 2004). Thus, local activities by international VCs not only provided an extra inflow of capital, but also of financial, technological, and business expertise, triggering learning opportunities on multiple levels. Besides the learning opportunities through direct interaction with the investment targets, co-investments with domestic investors also contribute to competence building for best

practice among financial intermediaries (Avnimelech *et al.*, 2006; Avnimelech and Teubal, 2008; Hain and Mas Tur, 2016). Furthermore, interaction between VCs and domestic authorities facilitates institutional reforms (Saxenian and Sabel, 2008).

Finally, what made Kenya an appealing investment target for top-tier Silicon Valley VCs and other international tech-investors, and how can policy facilitate further advances in this direction? The attraction of foreign VC investments, as well as the creation of flourishing domestic VC markets, has become an integral goal of recent innovation-related public policies in developed and emerging economies alike (Beck *et al.*, 2008; Kortum and Lerner, 2000). Such attempts showed varying success (Cumming, 2010, 2011) and illustrate that there exists no Silicon Valley blueprint that can be transferred to a different economic and institutional context without adaption. Yet, some developed and also emerging economies such as Israel (Avnimelech *et al.*, 2006), Brazil (de Lima Ribeiro and de Carvalho, 2008), Taiwan (Saxenian and Sabel, 2008), India (Dossani and Kenney, 2002), and China (Xiao, 2002) succeeded in the development of a vibrant VC industry from scratch. Lessons learned from successes and failures alike are that policies that jointly tackle supply/demand for high-tech finance and encourage cooperation between local and foreign investors prove to be the most efficient (Avnimelech *et al.*, 2006; Avnimelech and Teubal, 2008; Hain *et al.*, 2016). Likewise, the increasing number of returnees with education or work experience outside SSA are also said to not only provide an influx of outside knowledge but also valuable signals for VCs looking for high-quality investment opportunities (Hain *et al.*, 2017).

We also believe that findings from studies in advanced economies about the positive effects of knowledge-intensive business services on the countries' innovation systems (see e.g. Muller and Zenker, 2001) may be true in developing countries. As MNEs – especially from Asia – begin to integrate African companies and subsidiaries into their GVCs, it becomes important for the countries to find out how they can increase their gains from these collaborations. Having the capacity to provide advanced services is likely to increase potential benefits from MNEs presence. Furthermore, scholars within the GVC tradition have found that clustering and interaction between companies in the developing world is likely to improve the competitiveness of enterprises in international markets (Giuliani *et al.*, 2005). One aspect that many of the investors in our sample have in common is the strong wish to increase interaction on many levels, which is said to be crucial for the development of a venture's long-term learning and innovation capacity (Christensen *et al.*, forthcoming). Take for instance VilCap's "Innovations for Agriculture 2014" challenge that brought together Kenyan entrepreneurs, working with agriculture innovations. There are also many other examples of international network building, fostered by these new investors. In addition to the positive effects attributed to the growth of supported companies, their products and services, and the capacity increasing VC activity in general, the backed technology-intensive start-ups in SSAs are likely to have positive spillover effects on other sectors. Many of the companies in our sample are providing IT-based business services, which can benefit local manufacturing or retail enterprises, allowing them to offer more sophisticated services.

6. Conclusion

In this paper, we explored, mapped, and classified the changing pattern and characteristics of international finance flows into the emerging entrepreneurial ecosystems of SSA, and discussed how such investments contribute to competence building and sustainable development. Existing literature on international finance flows toward SSA mainly focused on the drivers and impact of foreign aid and FDI. However, VC in SSA is a rather new and, albeit its potential implications for economic development and capacity building, as of yet an unstudied phenomenon.

By exploring and mapping this novel phenomenon, we make a set of noteworthy observations. First, we see that recent VC activity broadly differs from the behavior of traditional foreign providers of capital in SSA. In many cases, the financial investment is accompanied by intensive technical and business support; some of these investors are actively building up networks and connecting supported companies. We develop a novel taxonomy of technology investments in LICs, guiding further research on the conditions, impact, practical, and policy implications of this new form of finance flows.

We thereby contribute to the existing body of knowledge in several ways. First, we enrich the literature in the internationalization of VC by analyzing investment activity in a novel context, which up to now has been considered as not suitable to traditional VC investment practices. At selected cases we demonstrate how VCs are able to adjust their business model in order to be functional in high risk and unstable environments, which the institutional business infrastructure VCs enjoy in their preferred environments. We further illustrate how knowledge and competences within an entrepreneurial ecosystem co-evolve with finance (Avnimelech *et al.*, 2006), and how international finance can compensate for lacking domestic capital markets. Here, the suggested taxonomy of VC investments might prove helpful to identify companies, sectors, and regions likely to attract VC investments in the future. Second, our findings illustrate alternative for economic development in LICs, enabled by globally connected financial markets as well as ICT technology, which are up to now not conceptualized in the predominant literature on catching up and industrial upgrading (Park *et al.*, 2017a, b). Third, our findings may also stimulate discussions in the recently emerging literature on inclusive innovation (e.g. Chataway *et al.*, 2014), which is concerned with the broader impact of innovation activity on socioeconomic outcomes of marginalized groups that are often excluded from the benefits of innovation activity. The here observed that VC flows might then be interpreted as enabling financial innovations for inclusive outcomes in knowledge-intensive entrepreneurship, which up to now were not considered explicitly in this stream of literature.

Finally, and more oriented toward applied research implications, we are, to the best of our knowledge, the first to exploit the rich information and graph-based structure of the CB database to explore technological investments in the economically less-developed context of SSA. Thereby, we demonstrate the advantage of using community-curated data on investments and entrepreneurship in environments usually considered as data-sparse.

Our findings also provide direct implications for policymakers. First, it appears imperative that states provide the necessary conditions for the development of modern communication infrastructures, by actively investing in their construction and maintenance or by providing a favorable and stable institutional setup for private providers. Second, policies should acknowledge the potential of the emerging digital entrepreneurship and support the activities of technology hubs, as well as wider network formation. This may facilitate access to resources that are often lacking and at the same time further legitimize entrepreneurship as a career choice (Bramann, 2017). It is argued that the drive to modernization in independent Africa led to experimentation with development models which were borrowed from outside. Most of the experiments failed as they did not seek African solutions to African problems (Hyden, 1990). Therefore, it is argued that outside interventions should build on Africa's internal dynamics and institutions to develop alternative strategies. Equally, understanding the interplay between investors, local institutions, and regulations could provide valuable insights for innovation policy.

Finally, we also provide implications for practitioners, particularly VCs considering to engage in investments in LICs. Particularly, the combination of non-profit accelerators and incubators with for-profit investors might have the potential to be replicated in other environments characterized by a lack of institutional infrastructure, easing the deal selection as well as the initial due diligence and mentoring phase. Thus, examples of new

investment practices might also provide some guidance for SRI, donor, and other socially motivated impact investors. Furthermore, our findings are also of value for managers and (nascent) entrepreneurs, illustrating the current “window of opportunity” and potentials to accessing foreign capital and addressing global markets by utilizing a combination of local as well as global knowledge and competences.

However, this first attempt to explore an emerging phenomenon is subject to a number of limitations. First, the complex hybrid nature of many investors and investment targets described in this study makes an attempt to classify them along a narrow set of dimensions a worthy yet fuzzy endeavor. Being aware of the information loss as a consequence of collapsing the phenomenon in a two-dimensional matrix, we suggest future research, and emphasize that the presented evidence, which is mostly based on desk research and evaluation of internet and social media appearance of the organizations, is up to now suggestive in nature, and in need of future substantiation. Here, we suggest the collection of further contextual data field research and interview-based in-depth expert-based evaluations. Moreover, in our line of arguments, we implicitly assume that the interaction between investors and start-ups *per se* leads to learning and capacity building, as is mostly the case in advanced economies. Yet, it cannot be ruled out that western business practices and other knowledge is not suited for these start-ups. Again, in-depth research about the interaction between the investors and funded companies is needed to shed light on that. Finally, the nature of the CB database makes a bias of our sample in favor of tech start-ups likely. While we do not consider it as a problem against the context of our study, one has to be aware that our sample may not be representative for the larger population of entrepreneurial ventures and SMEs within SSA. To sum up, we believe the developed investment taxonomy to be a useful tool to analyze the dynamics of emerging entrepreneurial ecosystems based on revealed foreign investment activity, yet preliminary in nature and far from a level of richness needed to develop a solid theoretical framework.

While we in the previous section already point toward a set of broad questions arising from our exploratory analysis, we would like to conclude by suggesting some concrete avenues of future research which we consider promising. First, shedding additional light on the rationales of the newly in SSA active VCs and their impact on emerging entrepreneurial ecosystems seems appealing. Not only do we for the first time see risk capital investors from advanced economies targeting innovative, often high-impact projects in SSA, but we also identify cases of new selection mechanisms and financial instruments applied. Our mapping of the investor-enterprise network suggests that a further exploration of the co-investment patterns might reveal the interaction patterns between the investors. Such an exercise is likely to shed light on the development and diffusion of new business and funding models to finance innovation in less-developed countries. Likewise, a more thorough mapping of funded enterprises in less-developed countries can reveal a more clear picture of the different types of ventures and technologies that are recently emerging in less-developed regions around the globe. Furthermore, we suggest personal networks to likely play an important role in the development of ventures. In our sample, we can see that some of the company founders have received education in the USA – particularly in the Bay Area. We can only speculate as to whether the investments into their companies by Silicon Valley investors are related to their personal networks. Plaza and Ratha (2011) pointed out the importance of the diaspora for the development of African countries, among others the role of migrant networks for international investment. So-called returnees that start up business in Kenya bring technical knowledge and their personal and professional networks, which is also valued by western VCs (Hain *et al.*, 2017). Analyzing these networks could be a way to identify key actors, gatekeepers, and enablers of this increasing local-global interaction. The graph data structure of CB is well suited for these kinds of studies. Also, it can easily be linked to other data sources. The microblogging service Twitter, which is very popular in

the corporate world in the USA and – due to its lean structure – increasingly used in many less-developed countries, can be used to enrich the CB data. It can also be utilized to identify additional important actors and connections. Techniques from natural language processing, such as entity extraction (cf. Jurowetzki and Hain, 2014), can be applied additionally to map interaction patterns between companies, technologies, institutions, and persons from unstructured text data available online. Generally, novel methods of data creation and processing (for an overview, cf. Hain and Jurowetzki, forthcoming) have the potential to provide valuable insights on the development of entrepreneurial ecosystems in environments which are traditionally believed to be data-sparse (e.g. Park *et al.*, 2017a).

Notes

1. A number of studies on Chinese Activities in Africa have been published in a special issue of the *Review of African Political Economy* (2008) and a Special Issue of *World Development* in 2008.
2. For instance, the amount of overseas development assistance (ODA) to SSA in 2003 was equivalent to 11.7 percent of the continent's GNI (excluding Nigeria and South Africa).
3. In fact, according to the World Bank Country and Lending Group, 2016 classification, 33 African countries are categorized as "middle-income countries" (MICs).
4. The recent report by IMF (2016) concludes slightly different, identifying "multispeed growth" across the continent. While on average growth has declined abruptly in resource-intensive countries and for commodity exporters, countries that do not belong to this group – roughly half of the countries in SSA – are continuing to benefit from improving business environments and infrastructure improvements.
5. We are well aware that these notions are not describing the same phenomenon.
6. Following various lines of thought on economic complexity (Hidalgo and Hausmann, 2009) and organizational capabilities, we understand the latter notion as an embodiment of knowledge and skill. While these can be transferred or externally acquired, capabilities have to be developed within the organization, whereby absorption of knowledge (Cohen and Levinthal, 1990) plays a crucial role. In addition, we use the notion of competence, which describes a combination of knowledge and skill that is useful in a particular context.
7. Reports such as Zavatta (2008) list some first domestic VC schemes, but they do not mention international VC capitals whatsoever. Recently, Gugu and Mworio (2017) to the best of our knowledge were the first to explore the dynamics of VC investments in SSA.
8. Including all the determinants mentioned here, Groh *et al.* (2007, 2010) developed the "Venture Capital Attractiveness index" as a tool for investors and policymakers. Research along these lines very much reflects the predominant understanding of the first wave of VC globalization.
9. Further examples for venture capital activities in early emerging and transition economies can be found in Poland (Klonowski, 2005), Hungary (Karsai *et al.*, 1997), and Vietnam (Scheela and Van Dinh, 2004).
10. Please note that due to a change in ownership of CrunchBase, the API is no longer freely accessible for research. Individual lookup of companies and investors is still possible.
11. Alluvial diagrams represent a powerful tool to visualize the degree of connectedness and interaction between distinct heterogeneous groups within multi-modal networks (e.g. Rosvall and Bergstrom, 2010).
12. Easterly (2006) summarizes in his book many problematic aspects of foreign aid activity.
13. The activity of foreign firms in SSA has shifted strongly toward technology-, information-, and media-related sectors during the last decade (Ernest and Young, 2014).
14. Erik Hersman, co-developer Ushahidi, TED talk 2009.

15. For instance, countries such as Korea or Finland have managed a rapid catching up in technology-based sectors not based on VC or similar types of investments at all. Furthermore, VC has shown to be not well suited for industries that are very capital intense in upfront and scaling-up investments, as well as for such industries with slow and steady as opposed to very rapid growth opportunities.

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Corresponding author

Daniel Stefan Hain can be contacted at: dsh@business.aau.dk